



HEALTH RELATED QUALITY OF LIFE IN CHILDREN WITH CHRONIC KIDNEY DISEASE

Paediatric Medicine

Pranesh*	Junior Resident Department Of Pediatric Medicine Sir Padampat Neonatal And Child Health Institute, SMS Medical College, Jaipur Rajasthan *Corresponding Author
Amarjeet Mehta	Senior Professor Department Of Pediatric Medicine Sir Padampat Neonatal And Child Health Institute, SMS Medical College, Jaipur Rajasthan

ABSTRACT

Introduction: Very less data exists on chronic kidney disease (CKD) and its impact on health-related quality of life (HRQoL) in developing countries like India. QoL itself has tremendous influence on disease morbidity, mortality and worst suffering. **Methods:** Total 100 cases were included (50 each in CKD and non-CKD). HRQoL was assessed by using PedsQL™ version 4.0. Factors predicting poor functioning were evaluated by liner regression analysis. **Results:** Out of 50 cases in each group, mean age were 9.9 ± 3.80 and 7.14 ± 3.72 (CKD vs non-CKD), majority were males (74%). Majority of cases presented in advance stage of CKD 3b-5 (72%; stage 5) and hypoplasia/dysplasia (46%) was most frequent underlying aetiology. 28% of them received RRT (HD and PD). Fatigue (92%) was common clinical symptom. Anaemia (90%) was most consistent morbidity. ARI ($p=0.005$), mineral bone disease (MBD) ($p=0.006$), anaemia ($p<0.001$) and uraemia ($p=0.006$) were the factors that associated with poor QoL. Overall scores of CKD were higher than non-CKD (51 vs 27 by child report $p<0.001$; 49 vs 31 with parent proxy $p<0.001$). physical domain was affected the most (19.24 ± 4.81 by child report $p<0.001$; 18.18 ± 4.83 by parent proxy $p<0.001$). **Conclusion:** Unlike other studies, many children were presented in ESRD and Hypoplasia was the commonest aetiology. Overall scores of CKD were significantly higher than non-CKD. Therapeutic modalities like RRT (HD & PD), morbidities like ARI and MBD further lowered HRQoL. Anaemia, uraemia, hypocalcaemia and hyperkalaemia were modifiable factors whereas advance stage of disease, duration of disease illness and duration of hospital stay were non-modifiable factors if associated, may predict poor HRQoL.

KEYWORDS

chronic kidney disease, quality of life, dialysis

INTRODUCTION

In 1994 the World Health Organization Quality of Life Group (WHOQOL) was created which defined quality of life as, "an individual's perception of their position in life in the context of culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns"¹. The studies conducted showed that children 2–16 years old with mild to moderate CKD had a poorer overall health-related quality of life (HRQoL) and poorer physical, school, emotional, and social functioning when compared with healthy children². The objectives of the present study were to assess health related quality of life in children suffering from chronic kidney disease and in comparison with non-chronic kidney diseases in their various domains and there by to find out potential factors associated with poor QoL. The compelling reason to conduct this study was, apart from the disease course, the QoL of life also has the tremendous effect on overall morbidity and mortality of the child.

MATERIALS AND METHODS

The study was conducted in the Pediatric Nephrology unit/Nephrology clinics/OPD/other medical units in the Department of Pediatrics, SPMCHI, SMS Medical College, Jaipur from June 2021 to August 2022. It was cross-sectional observational study, conducted on 100 children of aged 2 to 18 years (each 50 cases were enrolled in CKD and non-CKD group). All children diagnosed with chronic kidney disease were included in CKD group and those with acute kidney injury (AKI), simple urinary tract infection, nephrotic syndrome, acute glomerulonephritis (AGN), or any renal condition other than CKD were enrolled in group non-CKD group. Those who were not willing to participate in study, critically ill, and aged <2 years or >18 years were excluded from the study.

The study conducted on interview basis. Initially demographic (both caregivers and study subjects), clinical and laboratory data were collected as per proforma. The CKD definition and its classification were adapted from KDOQI³ and the glomerular filtration rate was estimated by modified Shwartz equation⁴.

Measurement Of HRQOL

For measurement of HRQoL, Pediatric Quality of Life Inventory version 4.0 (PedsQL™) questionnaire tool was used. The questionnaires were made available in both English and Hindi language and it was explained adequately to their level of understanding. In less than 10 years only caregiver's response is recorded as parent proxy report, Whereas children of age more than 10 years, responses of both, the patient and caregiver were recorded independently (child report and parent proxy report). Both child and

parent's interview were conducted separately to avoid common opinion bias.

Paediatric Quality of Life (PedsQL) 4.0 Generic Core Scales™ has total 4 domains: physical functioning, emotional functioning, social functioning, and school functioning. It is consisting of total 23 questions In the PedsQL™ version 4.0. higher the scores poorer the poor health functioning and vice versa. Informed consent and prior approval of college ethical committee was taken. permission/license was obtained from Mapi's trust Prior to using PedsQL™ questionnaire tool.

Statistical Analysis

Scores were compared between the two groups (CKD and non-CKD) using the unpaired t-test. The p value of <0.05 was considered statistically significant. Poor health functioning was reflected by higher scores. linear regressions were applied to evaluate factors associated with poor outcome.

RESULTS

Baseline Characteristics Of CKD & non-CKD

Among CKD group majority that is 24 (48%) were belonging to 7-12 year age group and mean age group was 9.92 ± 3.80 . whereas in non-CKD group 28 (56%) cases were in 3-6 years age group and mean age was 7.14 ± 3.72 (Table No.1). in both group majority were males (CKD vs non-CKD: 74% vs 58%) and most of them were coming from rural area (CKD vs non-CKD: 61% vs 56%). Among CKD group 100% of them were emotionally concerned about their disease and 92% were reported fatigue as most common physical symptom. 58% of them were not capable of peer activity and 86% of CKD children missed their school out of illness. As compared, in non-CKD group it was observed that only 28% of them reported fatigue and only 10% of them were not capable of peer activity. School absence was noticed in 38% children and 68% of them were emotionally concerned about their disease.

Caregivers were comparable among CKD and non-CKD, where 94% of children were primarily cared by mothers (Table no.1). Majority of them were educated till high school [21 (42%) in CKD and 19 (38%) non-CKD]. In CKD group 10 (20%) pursued till higher secondary, 6 (12%) were graduates and 10 (20%) were illiterate. Where as in non-CKD 15 (30%) were graduates, 4 (8%) of them educated till higher secondary and 6 (12%) of them were illiterate.

CKD Group Characteristics

36 (72%) of CKD children presented in ESRD, that is stage V.

Followed by 22% and 2% in stage IV and III respectively. Among stage V, 14(28%) of each received hemodialysis and peritoneal dialysis as renal replacement therapy. 45(90%) of children had anemia as most common co-morbidities followed by 13(26%) had hypertension and 12(24%) had bony deformities. 29(58%) of CKD children were suffering from more than 3 co-morbidities simultaneously (Table No.2). Every one of them had significant pill burden, taking more 5 pills per day.

Among 50 CKD children, 22(44%) were underweight and 21(42%) were short for their age. 92% were anemic, blood urea nitrogen (BUN) was elevated in 100% and 80% of children had parathormone >200. Another 16% had Hyperkalemia, 72% had hypocalcemia and 52% were reported deficient in serum vitamin D levels. Most common underlying etiology for CKD was hypoplasia/dysplasia, noted in 46% of cases and 10% each had congenital anomalies of kidney and urinary tract (CAKUT) and chronic glomerulonephritis (CGN) (Table No.2)

HRQoL SCORES vs CKD GROUP

Higher scores reflect poor quality of life (QoL). Among CKD children aged between 12-18 years had poor QoL as compared to other age group (p=0.008), no statistically significant difference in QoL noted among males and females (p=0.309). Decrease in QoL was proportionate to advancement in CKD stage, that is stage V had poorest QoL compared to lower stages (52.13 ± 11.20, p=0.015). The children who received hemodialysis suffered poor QoL with highest scores (61.04 ± 7.67) as compared to those who were not on RRT (p<0.005).

that children who experienced frequent acute respiratory infections like pneumonia (p=0.005), had bony deformities (p=0.006) and anemia (p=0.087) had significant higher QoL scores indicating poor QoL. Children who suffered >3 morbidities simultaneously had worst QoL (53.31 ± 11.31, p=0.005). anemia (<0.001), uremia (0.0006), hyperkalemia (0.004) and hypocalcemia (p=0.020) if associated, had poor health functioning. (Table No.3)

Comparison Of Domains Of HRQOL In CKD To NON-CKD Group

In the present study, CKD group had significantly higher mean and SD scores among all domains of QoL compared to the non-CKD group (p<0.001). It reflects that CKD had a significant impact on quality of life compared to non-CKD. In both groups physical domain was most affected. (CKD-Child report :19.24±4.81; Parent proxy:18.18±4.83; p<0.001). Capable of peer activity in social domain was affected least. (Child report: 9.32±2.93; Parent proxy: 8.90±3.05; p<0.001). (Table No.4)

Adjusted Linear Regression Values For Evaluation Of Factor Association With PedsqL Domain And Overall Hrql Scores In Ckd Children

Among children less than 10 years of age where only a caregiver can give a proxy for the cases, it was observed that the advanced stage of CKD had a poor impact on overall scores (p=0.011). Whereas prolonged hospital stay for greater than 10 days (p=0.024) and hyperparathyroidism (p=0.015) had a significant impact only on the emotional domain of QoL. (Table No.5)

Whereas in children aged more than 10 years only prolonged hospital stay more than 10 days had significant impact on overall scores of QoL as reported by both parent proxy (p=0.0013) and child (p=0.00083). But only parents reported significant impact on physical component of QoL when duration of illness exceeds more than 10% of child age in years. (p=0.024). (Table No.5)

DISCUSSION

The present study was carried out in 100 children of age 2-18 years with 50 subjects in each CKD and non-CKD group. In CKD group 48% of children aged between 7-12 years and mean age group was 9.92±3.80 years. Whereas in non-CKD group, mean age was 7.14±3.72 years. It was comparable to the studies conducted by Ola A. Alhusaini et al¹² (8-12 years) and Peace D. Imani et al¹⁵ (the mean age was 9±1.23 years). Among 100 subjects 66% were males and 33% were females. The M:F ratio was 1.9:1. The male predominance can be explained by cultural practices preferring early medical advice for males compared to females. In others studies, by Joann Carlson et al⁸ observed 61% males, by Arwa M. El Shafei et al⁶ observed 54% males, by Maria E. Diaz-González de Ferris et al⁷ found 61% males. Among

100 children, 59% of them were from rural area and 41% were from urban area.

Mother was the main primary caregiver in present study (94% in both CKD and non-CKD group). Its due to cultural practices where females of the family take lead in care of dependents like children and old aged people in the family. In a study by Lima AGT et al⁸ where 89.8% of primary caregivers were mothers and in study by Peace D. Imani et al⁹ 85% were mothers. In present study majority (42% in CKD and 38% in non-CKD) were educated till high school only. In a study by Ola A. Alhusaini et al¹⁰ 52.2% till high school. 92% of CKD children had fatigue as most common symptom, then non-CKD children (28%). 86% of CKD children had to miss their school due to the illness/frequent health care visit, which was much higher compared to non-CKD children (only 38%). In a study by D. Imani et al⁷ where they found 58% children complained fatigue as frequent symptom and missed school days were higher in CKD group with median 14 days per month vs. only 4 in non-CKD group. 100% of parents as well as children emotionally concerned regarding illness and prognosis. But in a study by Peace D. Imani et al⁹ observed sleep disturbance was common symptom in emotional domain. 58% of CKD children were facing challenges to being capable of peer group activity compared to non-CKD children (only 5%).

CKD Group Charecteristics

The predominance of presentation in advanced stages especially in ESRD (72%) is due the fact that majority of early stages were poorly detected and treated in the periphery, and the early referral to tertiary care center in the initial stages was delayed. In the studies by Maria E. Diaz-González de Ferris et al⁷ 54% of children presented in stage 5, Belayneh Kefale et al¹¹ 24% in ESRD. Our study had lesser proportion of children on haemodialysis (28%) compared to study conducted by Arwa M. El Shafei et al⁶ among 55 ESRD patients, 60% of them were on Haemodialysis.

Among CKD cases, 45(90%) suffered from anemia, followed by 14(28%) from pneumonia, 13 (26%) from hypertension, 12 (24%) from bony deformities. The higher prevalence of the anaemia in CKD group is due to decreased production of erythropoietin, deficiency of Iron and folic acid. And bony deformity due to the mineral bone disease of CKD. In a study by Peace D. Imani et al⁹ found that anaemia (63%) was most common co-morbidity followed by CKD-MBD (47%). 100% of CKD children were taking more than 5 pills per day plus injectable like EPO. Most of them were on IFA, Calcium and Vitamin D supplements, anti-hypertensive, and steroids. In a study by Maria E. Diaz-González de Ferris et al⁷ found that, in CKD group the pill burden was 3 per day with 15% of them were in injectable form.

22 (44%) children were short stature, 21 (42%) were underweight. Matthew Harmer et al¹² found only 17.4% were underweight and 26.1% with short stature. This difference may be due to the fact that greater prevalence of acute and chronic malnutrition, advanced stage presentation, and associated protein-energy wasting in studied population.

Among 47 advanced CKD cases, 44(88%) had anaemia, 35(70%) had hypocalcaemia, 32(64%) had hyperphosphatemia, 39(78%) had hyperparathyroidism and 26(52%) had vitamin D deficiency. In ESRD progressive decline in EPO production and decreased production of activated form of vitamin D from kidney explains the bio-chemical derangement. Fredric O. Finkelstein et al¹³ and Peace D. Imani et al⁹ observed that anaemia was the frequently reported lab parameter in CKD children followed by vitamin D deficiency.

In the present study hypo/dysplasia of kidney found most common etiology in 23(46%), congenital anomaly of kidney and urinary tract (CAKUT) and chronic glomerulonephritis (CGN) 5(10%) each. In a study by Peace D. Imani et al⁹ found that CAKUT was the common etiology for 39% of CKD. The difference is because of in countries like India, availability of antenatal diagnostic capacity is limited and CAKUT may be missed. Moreover, small kidneys being asymptomatic till certain age and then later on developing renal failure leading to diagnosis of CKD.

HRQOL Vs Baseline Charecteristics Of CKD Group

HRQOL Scores Vs Age Groups In CKD And NON-CKD

Age group more than 12 years in CKD (at 95% CI, 55.63±12.69, p=0.008) had higher mean scores of QoL indicating very low HRQoL.

This is explained by the fact that by the 12 year or more of age children will be reaching advanced stages of CKD, suffering from multiple comorbidities. They were found to be more symptomatic like fatigue and miss school out of illness adds to poor QoL. Peace D. Imani et al¹⁵ found worse QoL in CKD children among age group greater than 10 years. In the present study gender had no influence on HRQoL in CKD group (p=0.309). But Belayneh Kefale et al¹¹ observed that male gender was associated with poor QoL (p=0.038)

Stage 5 CKD had higher mean scores (52.13±11.20 p=0.015) compared to other stages. As the stage advances the complications, morbidities, frequency of hospitalizations, pill burden increases and leads to compromised QoL in advanced stages as ESRD. Belayneh Kefale et al¹¹ found scores in all dimensions were impaired progressively and significantly (p<0.05) across increasing stages of CKD.

The patients who were on haemodialysis had very high QoL scores (61.07±7.67, p<0.005) reflecting poor functioning compared to other CKD patients who were not on the haemodialysis (41.68±8.56). frequent visit to health care setting for haemodialysis and associated acute complications warranting prolonged hospital stay reduces QoL. A study conducted by Khaled Abdel-Kader et al¹⁴ observed no significant difference in QoL of ESRD children either on RRT or not. The different findings in present study may be due to children and caregivers might have adapted to the procedures and chronic nature of the illness.

Children having ARI (55.82±12.03, p=0.005,) and bony deformity (56.41±11.33, p=0.006) had poor QoL when compared to other comorbidities. But anaemia being frequently associated with comorbidity, didn't demonstrate their influence on decreasing QoL (p=0.087) may be due to availability of effective treatment. The cases who suffered from 3 or more than 3 morbidities simultaneously, had poor QoL (53.31±11.31, p=0.005). Belayneh Kefale et al¹¹ they found significant reduction in QoL occurs when children suffered from 3 or more 3 co-morbidities (p<0.001).

The modifiable factors like, anaemia (70.18±1.37, p<0.001), uraemia (51.08±10.86, p=0.0006), hyperkalaemia (59.06±8.40, p=0.004) and hypocalcaemia (51.08±11.09, p=0.020) they were associated with significant lower QoL. Similarly, anaemia was associated with low QoL in physical domain, in studies conducted by Fredric O. Finkelstein et al¹³ (p=0.003) and Belayneh Kefale et al¹¹ (p<0.001).

Comparison Of Domain Of HRQOL In CKD And NON-CKD Group

In the present study, CKD group had significantly higher mean and SD scores among all domains compared to the non-CKD group (p<0.001) reflecting poor QoL in CKD children. Disease complications, associated morbidities, RRT, acute illness, malnutrition, bony deformity, fatigue, undergoing frequent painful procedures and limitation of daily activities explains the highest affection of CKD towards physical domain. In a study by Peace D. Imani et al⁹ showed that is CKD group had poor QoL in all domain compared to non-CKD group (p<0.001). physical (p=0.001) being most affected and social (p=0.003) being least affected domain.

Factors Associated With Poor QOL Of CKD Children

In age <10 years, due to increased disease morbidity in advanced stages of CKD decreases overall QoL (p=0.011). subsequently abnormal lab reports like increased PTH (p=0.015) and warranting of longer hospital stay (p=0.024) raises concerns in caregivers. Belayneh Kefale et al¹¹ found that advance stage of CKD, increased pill burden, >3 co-morbidities are factors which predict poor QoL.

Among children aged >10 years, both parent and child reported poor QoL in overall domains if associated with prolonged hospital stay more than 10 days (p=0.0048). But only parents reported significant impact on physical component of QoL when duration of illness exceeds more than 10% of child age in years. (p=0.024). This can be explained by the fact that as disease courses advances morbidities like CKD-MBD impacts maximum on physical domain and thereby limiting activities of daily living. Peace D. Imani et al⁹ identified advanced CKD (p=0.024), anemia (p=0.025) and vitamin D deficiency (p=0.025) as poor QoL predicting factors. This discrepancy in our findings might be due to holistic management available towards anemia and vitamin D deficiency in our Centre.

CONCLUSION

CKD adversely affect the QoL in all domains compared to the diseases other than CKD. Anemia, uremia, hyperkalemia, hyperparathyroidism, hypocalcemia were modifiable factors and prolonged hospital stay and stage of the CKD were non-modifiable factors which may potentially predict poor quality of life. Therefore, the assessment of HRQoL is to be regarded as a potentially valuable tool in disease management plan. Along with treatment of disease, improving QoL of these children should also be concern for treating physician.

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Conflicts Of Interest

There are no conflicts of interest

Table No.1 : Baseline characteristics

Sl. No	Patients	CKD n=50	Non-CKD n=50
1	Age group	3-6 years	11(22%)
		7-12 years	24(48%)
		13-18 years	15(30%)
2	Mean age	9.92 ± 3.80	7.14 ± 3.72
3	Gender	Male	37(74%)
		Female	13(26%)
4	Place of residence	Rural	31(61%)
		Urban	19(38%)
5	HRQoL domains		
	Physical	Fatigue Experiencing pain Limitation of activities of daily living	46(92%)
	Emotional	Concern Sleep disturbance	50(100%)
	Social	Not capable as peer activity	34(68%)
	School	School absence due to illness	29(58%)
	Primary Care giver		5(10%)
1	Primary caregiver	Mother	47(94%)
		Father	0%
		Brother	1(2%)
2	Literacy status	High school	3(6%)
		Higher secondary	1(2%)
		Graduate	4(8%)
		Uneducated	15(30%)

CKD- chronic kidney disease, HRQoL-Health-related quality of life

Table No. 2: CKD group Characteristics

Sl.No	Parameters	n=50
1	Stage of CKD	V
		IV
		III
2	RRT	Hemodialysis
		Peritoneal dialysis
3	Co-morbidities	Anemia
		Bony deformity
		Hypertension
		>3 morbidities
4	Pill burden	>5 pill/day
5	Anthropometry	Height <3 rd centile
		Weight <3 rd centile
6	Laboratory Parameter	Hemoglobin<10
		BUN
		Potassium>5.5
		Calcium<8.5
		PTH>200
		Vit D<20
7	Etiology of CKD	Hypoplasia/dysplasia
		CAKUT
		CGN
		Reflux nephropathy

CKD- chronic kidney disease, RRT- renal replacement therapy, BUN- blood urea nitrogen, PTH-parathormone, CAKUT-congenital anomalies of kidney and urinary tract, CGN-chronic glomerulonephritis.

Table no.3: HRQoL vs CKD group

Sl. No.		n=50	HRQoL overall scores	P value (intra-group)
1	Age group			
	12-18 years	15(30%)	55.63 ± 12.69	0.008*
	6-12 years	24(48%)	47.33 ± 10.42	
2	Gender			
	Male	37(74%)	49.74 ± 11.76	0.309
	Female	13(26%)	45.92 ± 10.78	
3	Stage of CKD			
	V	36(72%)	52.13 ± 11.20	0.015*
	IV	11(22%)	41.09 ± 7.76	
	III	3(6%)	37.50 ± 0.00	
4	RRT			
	Hemodialysis	14(28%)	61.07 ± 7.67	<0.005
	Not on hemodialysis	22(44%)	41.68 ± 8.56	
5	Co-morbidities			
	ARI	14(28%)	55.82 ± 12.03	0.005
	Bony deformity	12(24%)	56.41 ± 11.33	0.006
	Anemia	45(90%)	49.67 ± 11.30	0.0087
	>3 morbidities	29(58%)	53.21 ± 11.31	0.005
6	Lab parameters			
	Hemoglobin<10	46(92%)	70.18 ± 11.37	<0.001
	Urea >80	42(84%)	51.8 ± 10.86	0.0006
	Potassium>5.5	8(16%)	59.06 ± 8.40	0.004
	Calcium<8.5	36(72%)	51.08 ± 11.09	0.020

CKD- chronic kidney disease, HRQoL-Health-related quality of life, RRT- renal replacement therapy

Table No 4: Comparison of domains of HRQoL in CKD to non CKD group

			CKD group		Non-CKD group		Result (p value)
			Mean	SD	Mean	SD	
Physical functioning	Fatigue Experiencing pain Limitation of activities of daily living	Child	19.24	4.81	9.58	2.11	p<0.001*
		Parent proxy	18.18	4.83	10.94	3.86	p<0.001*
Emotional functioning	Concern Sleep disturbance	Child	10.64	2.78	6.00	2.24	p<0.001*
		Parent proxy	10.74	2.13	7.58	1.54	p<0.001*
Social functioning	Not capable of peer activity	Child	9.32	2.93	4.73	2.10	p<0.001*
		Parent proxy	8.90	3.05	5.65	2.59	p<0.001*
school functioning	Missing school out of illness	Child	12.52	2.79	7.64	1.43	p<0.001*
		Parent proxy	11.44	3.04	7.44	3.43	p<0.001*
Overall Score	Child		51.68	12.48	27.33	6.01	p<0.001*
		Parent proxy	49.32	11.63	31.46	9.89	p<0.001*

*Statistically significant

Table No. 5: Adjusted linear regression values for evaluation of factor association with PedsQL domain and overall HRQoL scores in CKD children

I) For age less than 10 years-parent proxy						
Risk factor		Physical score b (95% CI) (p-value)	Emotional score b (95% CI) (p-value)	Social score b (95% CI) (p-value)	School score b (95% CI) (p-value)	Overall score b (95% CI) (p-value)
1 Advanced CKD age<10 yrs (n=24)		0.482 (0.012 to 0.113)	0.403 (-0.0001 to 0.237)	0.331 (-0.015 to 0.132)	0.441 (0.007 to 0.144)	0.508 (0.006 to 0.044)
(p-value)		0.016 (S)	0.049 (S)	0.113 (NS)	0.030 (S)	0.011 ((S))
2 Number of hospital stay >10 days (n=13)		0.427 -0.253 to 1.514	0.616 0.350 to 4.270	0.317 -0.621 to 1.889	0.505 -0.131 to 2.107	0.484 -0.054 to 0.599

	(p-value)		0.144	0.0249	0.289	0.0782	0.093
3 Hb<10 (n=24)			0.095 -0.081 to 0.127	0.045 -0.221 to 0.271	0.076 -0.143 to 0.203	0.0407 -0.183 to 0.220	0.062 -0.040 to 0.053
	(p-value)		0.656	0.834	0.720	0.850	0.770
4 PTH>250 (n=17)			0.367 -9.74 to 59.52	0.577 19.80 to 158.79	0.276 -22.97 to 73.15	0.155 -32.85 to 59.10	0.387 -2.97 to 22.15
	(p-value)		0.146	0.015	0.283	0.552	0.124
5 Vitamin D deficiency <20 (n=11)			0.072 -0.50 to 0.618	0.220 -1.26 to 0.680	0.013 -0.851 to 0.822	0.157 -0.575 to 0.884	0.0099 -0.206 to 0.201
	(p-value)		0.832	0.514	0.969	0.643	0.976
II) For age more than 10 years- child report and parent proxy							
1 Advanced CKD age≥10 yrs (n=23)	a) Child report		0.078 (-0.027 to 0.038)	0.379 (-0.005 to 0.102)	0.259 (-0.023 to 0.090)	0.366 (-0.007 to 0.100)	0.231 (-0.006 to 0.019)
	p value		0.722 (NS)	0.074 (NS)	0.230 (NS)	0.085 (NS)	0.288 (NS)
	b) Parent proxy		0.079 (-0.023 to 0.034)	0.330 (-0.015 to 0.119)	0.085 (-0.045 to 0.066)	0.139 (-0.039 to 0.074)	0.146 (-0.009 to 0.018)
	p value		0.716 (NS)	0.123 (NS)	0.699 (NS)	0.526 (NS)	0.504 (NS)
2 Number of hospital stay >10 days (n=19)	a) Child report		0.626 0.780 to 3.520	0.617 1.287 to 6.113	0.718 2.186 to 6.485	0.609 1.334 to 6.665	0.700 0.474 to 1.507
	p value		0.0041	0.0048	0.0005	0.0056	0.00083
	b) Parent proxy		0.641 0.737 to 3.070	0.572 1.134 to 7.384	0.585 0.984 to 5.771	0.673 2.293 to 8.168	0.681 0.472 to 1.624
	p value		0.003	0.010	0.0084	0.0015	0.0013

REFERENCES

- "WHOQOL: Measuring Quality of Life". World Health Organization. Retrieved 22 May2020
- Gerson AC, Wentz A, Abraham AG et al (2010) Health-related quality of life of children with mild to moderate chronic kidney disease. *Pediatrics* 125(2):c349-357
- Andrew S. Levey, Kai-Uwe Eckardt, Yusuke Tsukamoto, Adiera Levin, Josef Coresh, Jerome Rossert, Dick De Zeeuw, Thomas H. Hostetter, Norbert Lameire, And Garabed Eknoyan: "Definition and classification of chronic kidney disease: A position statement from Kidney Disease: Improving Global Outcomes (KDIGO)" ; Kidney International, Vol. 67 (2005), pp. 2089-2100
- Schwartz GJ, Muñoz A, Schneider MF et al (2009) New equations to estimate GFR in children with CKD. *J Am Soc Nephrol* 20(3):629-637
- Carlson J, Gerson AC, Matheson MB, Manne S, Warady BA, Hooper SR, Lande M, Harshman LA, Johnson RJ, Shinnar S, Kogon AJ, Furth S. A longitudinal analysis of the effect of anemia on health-related quality of life in children with mild-to-moderate chronic kidney disease. *Pediatr Nephrol*. 2020 Sep;35(9):1659-1667. doi: 10.1007/s00467-020-04569-5. Epub 2020 Apr 24. PMID: 32333284; PMCID: PMC8958595
- El Shafei AM, Soliman Hegazy I, Fadel FI, Nagy EM. Assessment of Quality of Life among Children with End-Stage Renal Disease: A Cross-Sectional Study. *J Environ Public Health*. 2018 Sep 16;2018:8565498. doi: 10.1155/2018/8565498. PMID: 30305825; PMCID: PMC6165587.
- Díaz-González de Ferris ME, Pierce CB, Gipson DS, Furth SL, Warady BA, Hooper SR; Authoring group for the CKiD Study. Health-related quality of life in children with chronic kidney disease is affected by the number of medications. *Pediatr Nephrol*. 2021 May;36(5):1307-1310. doi: 10.1007/s00467-021-04919-x. Epub 2021 Feb 5. PMID: 33547529; PMCID: PMC8935420
- Lima AGT, Sales CCDS, Serafim WFL. Burden, depression and anxiety in primary caregivers of children and adolescents in renal replacement therapy. *J Bras Nefrol*. 2019 Jul-Sep;41(3):356-363. doi: 10.1590/2175-8239-JBN-2018-0039. Epub 2019 Feb 12. PMID: 30806443; PMCID: PMC6788840.
- Imani PD, Aujo J, Kiguli S, Srivaths P, Brewer ED. Chronic kidney disease impacts health-related quality of life of children in Uganda, East Africa. *Pediatr Nephrol*. 2021 Feb;36(2):323-331. doi: 10.1007/s00467-020-04705-1. Epub 2020 Jul 31. PMID: 32737578.
- Ola A. Alhusaini, MD, Lamis A. Wayyani, MD, Hadeer E. Daftardar, MD, Mariyah M. Gamlo, MD, Zainab A. Alkhayat, MD, Abeer S. Alghamdi, MD, Osama Y. Safdar, MBBS, FRCP: Comparison of quality of life in children undergoing peritoneal dialysis versus hemodialysis. *Saudi Med J* 2019; Vol. 40 (8): 840-843 doi:10.15537/smj.2019.7.12747.
- Belayneh KefaleID1 *, Minyahil Alebachew2 , Yewondwossen Tadesse3 , Ephrem Engidawork2; Quality of life and its predictors among patients with chronic kidney disease: A hospital-based cross sectional study. <https://doi.org/10.1371/journal.pone.0212184> February 27, 2019
- Harner M, Wootton S, Gilbert R, Anderson C. Association of nutritional status and health-related quality of life in children with chronic kidney disease. *Qual Life Res*. 2019;28(6):1565-1573. doi:10.1007/s11136-019-02104-0
- Fredric O. Finkelstein, Kenneth Story, Catherine Firaneek, David Mendelsohn, Paul Barre, Tomoko Takano, Steven Soroka, and Salim Mujais; Health-Related Quality of Life and Hemoglobin Levels in Chronic Kidney Disease Patients. *Clin J Am Soc Nephrol* 4: 33-38, 2009.
- Khaled Abdel-Kader, Larissa Myaskovsky, Irina Karpov, Jay Shah, Rachel Hess, Mary Amanda Dew, and Mark Unruh Individual Quality of Life in Chronic Kidney Disease: Influence of Age and Dialysis Modality *Clin J Am Soc Nephrol* 4: 711-718, 2009.